

OTHER PBT CHEMICALS

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- Polychlorinated biphenyls (PCBs)
- Tetrabromobisphenol A (TBBPA)
- Hexachlorobenzene (HCB)
- Pentachlorobenzene
- Octachlorostyrene (OCS)

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POLYCHLORINATED BIPHENYLS (PCBs)

- PBT activity threshold: 10 pounds
- Most manufacture of PCBs banned in 1976
 - Further restrictions on the use of PCBs

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POLYCHLORINATED BIPHENYLS (PCBs)

- Current and/or former products containing PCBs:
 - Dielectric agents
 - Heat transfer agents
 - Lubricants
 - Flame retardants
 - Plasticizers
 - Waterproofing materials
 - Used oils

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POLYCHLORINATED BIPHENYLS (PCBs)

■ Manufacturing

- PCBs may be manufactured as a product of incomplete combustion (PICs)

■ Processing

- Recycling or reuse of PCBs

■ Otherwise use

- Installation of PCBs into electrical equipment
- On-site treating or disposing PCB-contaminated waste received from off-site
- Combusting PCB-contaminated oil

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POLYCHLORINATED BIPHENYLS (PCBs)

■ Not manufacturing, processing, or otherwise use

- On-site disposal or treatment of PCBs not received from off-site
- Off-site shipment of PCBs for disposal or treatment

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POLYCHLORINATED BIPHENYLS (PCBs)

■ Default air emission factors (Ref. 2):

- Municipal waste combustion 5.5 lbs./million ton waste burned
- Medical waste incineration 46.5 lbs./million ton waste burned
- Other biological incineration 46.5 lbs./million ton waste burned
- Sewage sludge incineration 10.8 lbs./million ton dry sludge burned
- Scrap tire incineration 3.78 lbs./million ton tire burned

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POLYCHLORINATED BIPHENYLS (PCBs)

■ Default air emission factors (Ref. 1):

- Landfill waste gas flare 6.10×10^{-3} lb./million Btu heat input
- Incineration (refuse derived fuel (RDF)) 180 lbs./million ton RDF burned

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POLYCHLORINATED BIPHENYLS (PCBs)

■ For more information:

1. *Guidance for Reporting Toxic Chemicals: Pesticides and Other Persistent Bioaccumulative Toxic (PBT) Chemicals*. U.S. EPA, Office of Information Analysis and Access. August 2001. Available at <http://www.epa.gov/tri/guidance.htm>
2. *1990 Emissions Inventory of Section 112(c)(6) Pollutants*. U.S. EPA. 1998. Available at <http://www.epa.gov/ttncaaa1/t3/meta/m23804.html>

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TETRABROMOBISPHENOL A (TBBPA)

- PBT activity threshold: 100 pounds
- TBBPA - flame retardant used in plastics and engineering resins for printed circuit boards and computer equipment
- TBBPA is used in manufacturing polymers, such as
 - Acrylonitrile Butadiene Styrene (ABS)
 - Epoxy and polycarbonate resins
 - High-impact polystyrene
 - Phenolic resins
 - Adhesives
 - Unsaturated polyester resins
 - Thermoplastic polyesters

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TETRABROMOBISPHENOL A

■ TBBPA - used as a flame retardant two ways

- Reactive TBBPA - chemically bound to a polymer backbone. TBBPA ceases to exist, except for some small residual amounts
 - » Used in a liquid epoxy mixture to make printed circuit boards
- Additive TBBPA - added to mixture, but not reacted. TBBPA retains its chemical identity
 - » TBBPA concentrations can exceed 15% in some ABS resins

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TETRABROMOBISPHENOL A

- What facilities are impacted?
 - Manufacturers and processors of TBBPA
 - Processors of plastics containing TBBPA, such as manufacturers of printed circuit boards and computer housings
 - Waste management facilities
- Facilities using computers that contain TBBPA in their housings not impacted
 - Probably qualify for the articles exemption

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HEXACHLOROBENZENE (HCB)

- PBT activity threshold: 10 pounds
- Up until 1985, manufactured as a pesticide/fungicide used to treat wheat seeds, onions, and sorghum
- Manufactured as an impurity or formed as a by-product during production of maleic anhydride and propazine, pentachlorophenol, pesticides, chlorinated organic chemicals, chlorine gas
- Impurity in pesticides (Ref. 4):
 - 1,000 ppm in Dacthal
 - 50 ppm in chlorothalonil and picloram
 - 1 ppm in atrazine and simazine
 - 100 ppm in lindane
 - 500 ppm in pentachloronitrobenzene

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HEXACHLOROBENZENE (HCB)

- May be manufactured in refining operations
- May be manufactured in coal-fired boilers
 - 1.2 lbs./million ton coal burned in an utility boiler (Ref. 2)
 - 0.16 lb./million ton coal burned in an industrial boiler (Ref. 2)
- Other combustion
 - Wood/bark waste combustion 0.12 lb./million ton wood waste burned (Ref. 2)

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HEXACHLOROBENZENE (HCB)

- Incineration of waste manufactures HCB (Ref. 2):
 - 58.0 lbs./million ton municipal waste burned (single chamber/waterwall with electrostatic precipitator (ESP)/dry scrubber)
 - 1.71 lbs./million ton biomedical waste incinerated
 - 0.660 lb./million ton dry sewage sludge incinerated
 - 538 lbs./million ton wood waste/municipal refuse burned (uncontrolled)

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HEXACHLOROBENZENE (HCB)

- May be manufactured in the production of carbon tetrachloride, perchloroethylene, trichloroethylene, ethylene dichloride, and 1,1,1-trichloroethane
 - Usually found in the still bottoms from chlorinated organic chemical purification
 - Is emitted to air from chlorinated organic chemical purification (Ref. 3)
 - » 81.0 lbs. emitted/thousand ton carbon tetrachloride produced
 - » 86.2 lbs. emitted/thousand ton perchloroethylene produced

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HEXACHLOROBENZENE (HCB)

- May be manufactured during high-temperature processes involving chlorine atoms
 - Cement manufacturing
 - » 0.34 lb./million ton clinker produced (controlled) (Ref. 2)
- Manufactured at metal foundries/smelters
 - Magnesium production - magnesium chloride reduced at carbon electrode and produces chlorinated organics (Ref.1)

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HEXACHLOROBENZENE (HCB)

■ For more information:

1. *Guidance for Reporting Toxic Chemicals: Pesticides and Other Persistent Bioaccumulative Toxic (PBT) Chemicals*. U.S. EPA, Office of Information Analysis and Access. August 2001. Available at <http://www.epa.gov/tri>
2. *Final—Supplementary Guide for Reporting to the National Pollutant Release Inventory—Alternate Thresholds-2000 and Emission Factor and Database for Alternate Threshold Substances*. Environment Canada, Pollution Data Branch. 2000. Available at <http://www.ec.gc.ca/pdb/npri/index.html>
3. *Estimation of National Hexachlorobenzene Emissions for 1990*. U.S. EPA, Office of Air Quality Planning and Standards. 1993.
4. *1990 Emissions Inventory of Section 112(c)(6) Pollutants*. U.S. EPA, Emissions, Monitoring and Analysis Division and Air Quality Strategies and Standards Division. 1998. Available at <http://www.epa.gov/ttncaaa1/t3/meta/m23804.html>

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PENTACHLOROBENZENE

- PBT activity threshold: 10 pounds
- Manufactured and processed as an intermediate in pentachloronitrobenzene production
 - Pentachlorobenzene is an impurity in pentachloronitrobenzene
 - Pentachlorobenzene also found in wastes from pentachloronitrobenzene production

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PENTACHLOROBENZENE

- Any high-temperature process involving chlorine may manufacture pentachlorobenzene
 - Waste incinerators, cement kilns, and secondary copper production
- Pentachlorobenzene is expected to be found where HCB found

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OCTACHLOROSTYRENE

- **PBT activity threshold: 10 pounds**
- **No commercial uses known**
- **Possible byproduct of chlorine production, chlorination reactions, and metal product/finishing operations**
- **Manufactured by the high-temperature incineration of chlorinated hydrocarbons**
- **Octachlorostyrene expected to be found where HCB found**